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## **FIVE-YEAR REVIEW REPORT**

### **THIRD FIVE-YEAR REVIEW REPORT FOR MYSTERY BRIDGE ROAD/ U.S. HIGHWAY 20 SUPERFUND SITE Natrona County Casper, Wyoming**

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## TABLE OF CONTENTS

<b>I.</b>	<b>Introduction .....</b>	<b>1</b>
<b>II.</b>	<b>Site Chronology .....</b>	<b>2</b>
<b>III.</b>	<b>Background .....</b>	<b>3</b>
	Location and Setting .....	3
	Site History .....	3
	KMI Facility .....	3
	DOW/DSI Facility .....	4
<b>IV.</b>	<b>Remedial Actions .....</b>	<b>5</b>
	KMI Facility .....	5
	DOW/DSI Facility .....	6
	Site-Wide Removal Action .....	7
	Remedy Operation and Maintenance .....	7
<b>V.</b>	<b>Progress since Second Five-Year Review .....</b>	<b>8</b>
<b>VI.</b>	<b>Five-Year Review Process .....</b>	<b>8</b>
	Administrative Components .....	8
	Community Involvement .....	9
	Local Interviews .....	9
	Document Review .....	9
	Data Review .....	10
	Site Inspection .....	11
<b>VII.</b>	<b>Technical Assessment .....</b>	<b>11</b>
	Question A: Is the remedy functioning as intended by the decision document? ..	11
	Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid? ..	12
	Question C: Has any other information come to light that could call into question the protectiveness of the remedy? .....	12
	Technical Assessment Summary .....	12
<b>VIII.</b>	<b>Issues .....</b>	<b>13</b>
<b>IX.</b>	<b>Recommendations and Follow-Up Action .....</b>	<b>13</b>
<b>X.</b>	<b>Protectiveness Statement .....</b>	<b>14</b>
<b>XI.</b>	<b>Next Review .....</b>	<b>15</b>

## **TABLES**

Table 1	Chronology of Site Events
Table 2	Resolution of Second Five-Year Review Issues and Recommendations
Table 3	Issues Identified
Table 4	Recommendations and Follow-Up Actions

## **ATTACHMENT**

Attachment 1	Site Figure
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## List of Acronyms

1,1-DCA	1,1-dichloroethane
1,1-DCE	1,1-dichloroethene
<i>t</i> -1,2-DCE	<i>trans</i> - 1,2 – dichloroethene
1,1,1 TCA	1,1,1-trichloroethane
AOC	Administrative Order on Consent
ARARs	Applicable or Relevant and Appropriate Requirements
BRA	Baseline Risk Assessment
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
DOW/DSI	Dow Chemical Company/Dowell Schlumberger, Inc.
GPM	Gallons per Minute
HQ	Hazard Quotient
IC	Institutional Control
KM	Kinder Morgan Energy Partners, L.P.
KMI	Kinder Morgan, Inc.
KN	KN Energy
LNAPL	Light Non-Aqueous Phase Liquid
MCL	Maximum Contaminant Levels
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU1	Operable Unit 1
OU2	Operable Unit 2
PCE	Perchloroethene
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SVE	Soil Vapor Extraction
TCE	Trichloroethene
UCL90	90% Upper Confidence Level
ug/L	Microgram per Liter
USEPA	United States Environmental Protection Agency
VHO	Volatile Halogenated Organics
VOC	Volatile Organic Compounds
WDEQ	Wyoming Department of Environmental Quality

## **Executive Summary**

The U.S. Environmental Protection Agency (EPA) Region 8 has conducted a third five-year review of the remedial action implemented at the Mystery Bridge Road/ U.S. Highway 20 Superfund Site ("Mystery Bridge" or the "Site") near Casper, Wyoming. The purpose of the five-year review is to determine whether the remedy at the Site remains protective of human health and the environment. The trigger action for this review is the completion of the second five-year review in September 2004. Because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unrestricted use and unlimited exposure, a five-year review is required by statute.

The Site is divided into two Operable Units. Operable Unit 1 (OU1) includes the ground water contaminant plumes and OU2 includes the sources for ground water contamination. Remediation of ground water contaminant sources under OU2 has been completed. The OU2 work was conducted under removal orders.

There are two distinct ground water contaminant plumes at the Site. One plume consists of Light Non-Aqueous Phase Liquid (LNAPL) and dissolved phase petroleum hydrocarbons originating on property owned by Kinder Morgan Energy Partners, L.P. This property was formerly owned by Kinder Morgan, Inc. (KMI) and Kinder Morgan Energy (KM Energy) and is where a natural gas processing and compressor station currently operates. The other plume is comprised of dissolved phase chlorinated solvents (primarily perchloroethene) originating on property owned and operated by Dow Chemical Company/Dowell Schlumberger, Inc. (DOW/DSI). This is the location of a former oil field services facility.

The Site remedy included operation of ground water extraction and treatment systems installed on the KMI and DOW/DSI properties. Ground water treatment was by air stripping. Other remedy components in the OU1 Record of Decision (ROD) included long-term ground water monitoring and institutional controls (ICs) to restrict ground water use within the area of contamination. The ROD identified maximum contaminant levels (MCLs) as the action levels for remediation of contaminants of concern. Remedial action objectives (RAOs) included preventing ingestion of contaminated ground water and restoration of the affected aquifer by reducing contaminant concentrations.

Remediation systems operated on the KMI property until August 1996 and the DOW/DSI property until April 2001. Routine ground water monitoring has been conducted at both sites. However, sporadic low-level detections of contaminants above performance standards have precluded compliance with the Remedial Action Objective (RAO) for aquifer restoration.

No major concerns were identified during this review. However, the IC restricting ground water use has not been implemented. Implementation of the IC is the responsibility of KMI and DOW/DSI in cooperation with the Wyoming Department of Environmental Quality and the Wyoming State Engineers Office.

Additionally, the potential for indoor air contamination has been reviewed in the past and determined to be insignificant. However, since more is now understood about this issue, this review recommends that a new review of potential indoor air contamination be conducted to ensure this potential avenue of exposure has been adequately addressed.

The remedy as designed, constructed, implemented and operated is currently protective of human health and the environment. Contaminated ground water remaining on the KMI and DOW/DSI facilities is not currently used. Ground water contamination in residential areas has remained at or below the MCLs for multiple monitoring events. A public water supply in the residential area minimizes the likelihood of human exposure to Site contaminants.

The remedial action at OU1 is protective and the removal actions at OU2 are protective. Because of these actions, the site is currently protective of human health and the environment. For the site to be protective in the long-term, institutional controls need to be implemented and ground water monitoring has to continue until ROD requirements are met. Land use restrictions need to be implemented on the KMI and DOW/DSI properties since clean up was not done to levels that allow for unrestricted use. Lastly, an analysis of the potential for indoor air contamination should be completed using current data to ensure that this exposure pathway has been adequately addressed.



## FIVE-YEAR REVIEW SUMMARY FORM

### SITE IDENTIFICATION

**Site name (from WasteLAN):** Mystery Bridge Road/U.S. Highway 20 Superfund Site

**EPA ID (from WasteLAN):** WYD981546005

**Region:** 8 **State:** WY **City/County:** Casper/Natrona

### SITE STATUS

**NPL status:** ☒ Final ☐ Deleted ☐ Other (specify) \_\_\_\_\_

**Remediation status** (choose all that apply): ☐ Under Construction ☒ Operating ☐ Complete

**Multiple OUs? \*** ☒ YES ☐ NO **Construction completion date:** 12/16/93

**Has site been put into reuse?** ☐ YES ☒ NO

### REVIEW STATUS

**Lead agency:** ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency \_\_\_\_\_

**Author name:** Frances L. Costanzi

**Author title:** Remedial Project Manager **Author affiliation:** U.S. EPA

**Review period: \*\*** 04/09 to 09/09

**Date(s) of site inspection:** 08/21/09

**Type of review:** ☒ Statutory ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only  
☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead  
☐ Regional Discretion

**Review number:** ☐ 1 (first) ☐ 2 (second) ☒ 3 (third) ☐ Other (specify) \_\_\_\_\_

#### Triggering action:

☐ Actual RA Onsite Construction at OU # \_\_\_\_\_ ☐ Actual RA Start at OU # \_\_\_\_\_  
☐ Construction Completion ☒ Previous Five-Year Review Report  
☐ Other (specify)

**Triggering action date (from WasteLAN):** September 2004

**Due date (five years after triggering action date):** September 2009

\* ["OU" refers to operable unit.]

**FIVE YEAR REVIEW SUMMARY FORM (CONTINUED)**

Item No.	Issue	Affects Current Protectiveness of Remedy	Affects Future Protectiveness of Remedy
1	Institutional control on ground water use not implemented.	N	Y
2	Institutional controls on KMI and DOW/DSI properties are not implemented.	N	Y
3	Sporadic ground water contamination above performance standards.	N	Y
4	Reoccurrence of light non-aqueous phase liquid in multiple monitoring wells during period of low-ground water table.	N	Y
5	Site documents indicate that indoor vapor issues are not an issue at the Site, but these documents are dated.	N	Y

**Recommendations and Follow-up Actions**

Item	Issue	Recommendation for Follow Up	Party	Milestone Date	Affects Protectiveness Y/N Current/Future	
1	Institutional control on ground water use not implemented.	Implement protocol in use at former Casper Amoco Refinery. Requires providing map to Wyoming State Engineers office illustrating area of concern. State Engineer then solicits technical opinion from Wyoming Department of Environmental Quality (WDEQ) when a well permit application is received. State Engineer then implements WDEQ recommendation. EPA notified of WDEQ determination.	PRP/ WDEQ	June 2010	N	Y
2	Institutional controls on KMI and DOW/DSI properties are not implemented.	Land use restrictions need to be implemented on the KMI and DOW/DSI properties since clean up was not done to levels that allow for unrestricted use.	PRPs /EPA	June 2010	N	Y
3	Sporadic ground water contamination above performance standards.	Continue monitoring of ground water quality trends.	PRP /EPA	Ongoing until ROD requirement is met	N	Y

Item	Issue	Recommendation for Follow Up	Party	Milestone Date	Affects Protectiveness	
					Y/N	Current/Future
4	Reoccurrence of light non-aqueous phase liquid in multiple monitoring wells during period of low-ground water table.	Continue monitoring of ground water quality trends.	PRP/ EPA	Ongoing until ROD requirement is met.	N	Y
5	Site documents indicate that indoor vapor issues are not an issue at the Site, but these documents are dated.	Conduct a review of the most recent data to ensure the indoor vapor exposure pathways remains protective.	EPA	June 2010	N	Y

#### Protectiveness Statement:

The remedy as implemented is currently protective of human health and the environment.

Operable Unit 1, which was focused on the contaminated groundwater at the Site, is currently protective of human health and the environment. Contaminated ground water remaining on the KMI and DOW/DSI facilities is not currently used. Ground water contamination in residential areas has remained at or below the action levels for multiple monitoring events. A public water supply in the residential area minimizes the likelihood of human exposure to Site contaminants. The protectiveness of the remedy will be further enhanced once institutional controls for ground water are implemented.

Operable Unit 2, which focused on the contaminant source areas, is currently protective of human health and the environment. Work under this OU was conducted under two removal orders for the KMI and DOW/DSI properties. The protectiveness of the remedy will be further enhanced once institutional controls are implemented.

#### Other Comments:

The potential for indoor air contamination has been reviewed in the past and determined to be insignificant. However, since more is now understood about this issue, this review recommends that a review of more recent data be conducted to ensure this potential avenue of exposure has been adequately addressed.



**Mystery Bridge Road/ U.S. Highway 20 Superfund Site  
Natrona County, Wyoming  
Third Five-Year Review Report**

**I. Introduction**

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this five-year review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The EPA Region 8 conducted the five-year review of remedial actions implemented at the Mystery Bridge Road/U.S. Highway 20 Superfund Site ("Mystery Bridge" or "the Site") near Casper, Wyoming. This review was conducted from April 2009 through September 2009. This report documents the results of the review.

This is the third five-year review for the Mystery Bridge Site. The triggering action for this review is the date of the second five-year review report, as shown in EPA's WasteLAN database: September 2004. Because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unrestricted use and unlimited exposure, another five-year review is required.

## II. Site Chronology

**Table 1. Chronology of Site Events**

Date	Event
1950's	DOW begins operations
1950's – 1970's	Suspected releases of chlorinated solvents at DOW/DSI facility
1965	KN Energy (currently Kinder Morgan, Inc (KMI)) begins operations
1965	10,000-gallon release of absorption oil at KN Energy facility
August 1986	Resident complaints of poor air and water quality
Late 1986	WDEQ begins Site Investigation
Late 1986	Wyoming provides bottled water to affected residents
March 1987	EPA initiates Expanded Site Investigation
December 1987	KN Energy and DOW/DSI entered into AOCs to perform a remedial investigation and feasibility study (RI/FS)
January 1988	Removal Actions initiated on DOW/DSI property
June 1988	Mystery Bridge Proposed for the NPL
January 1989	Permanent water supply system provided for affected residents
November 1989	Removal Actions initiated at KN Energy property
1990's	DOW/DSI operations suspended
August 1990	Mystery Bridge listed on the NPL
June 1990	RI/FS completed by KN Energy and DOW/DSI
September 1990	USEPA and WDEQ issue Record of Decision for OU1
October 1991	Consent Decree between KN Energy and DOW/DSI for remedial design and remedial action (RD/RA) entered by the court
February 1993	DOW/DSI RD complete
August 1993	DOW/DSI begins remedial construction
September 1993	KN Energy remedy constructed under Removal Order formally begins operating under OU1 Record of Decision (ROD)
November 1993	DOW/DSI remedial construction complete/system start-up
1994	Light non-aqueous phase liquid (LNAPL) recovery portion of KN Energy remediation system discontinued
August 1996	All active remediation at KN Energy facility discontinued
August 1997	KN Energy facility placed in post remedial action monitoring
April 1998	KN Energy provides Certification of Completion for Removal Actions under OU2
February 1999	First Statutory Five-Year Review completed
November 2000	Groundwater pump and treat system at KMI facility (formerly KN Energy) is abandoned
April 2001	DOW/DSI discontinues operation of pump and treat system
September 2004	Second Five-Year Review completed

### **III. Background**

#### **Location and Setting**

The Site is located in Natrona County northeast of Casper, Wyoming. A residential area comprises the majority of the Site. An industrial area where hazardous materials were used lies along the southern and western Site boundary. The Site is bordered to the north by the North Platte River, on the west by the former Sinclair/Little America Refining Company (LARCO), and on the south by U.S. Highway 20. The Sinclair/LARCO facility is currently operated by Texaco under a RCRA permit. Mystery Bridge Road and the Brookhurst subdivision extend along much of the northern and eastern perimeters of the Site (See Site Map - Attachment 1).

The residential area, located on the northern two-thirds of the Site, consists of 125 lots ranging in size from two to five acres. Approximately 100 homes were constructed on these lots at the time the Record of Decision (ROD) was signed. Approximately 40 homes remain in the subdivision. Many properties have been purchased by the LARCO facility over the years since the ROD. Houses that were located on those properties have been demolished.

A heavy and light industrial area is located along the southern perimeter of the Site to the south of a Burlington-Northern Railroad right-of-way and north of U.S Highway 20. Heavy industrial activities include natural gas processing by Kinder Morgan Energy Partners L.P., (formerly KMI and KN Energy) and petroleum refining by LARCO. The DOW/DSI property is the location of an inactive oil field service facility.

The topography in the area varies from flat or gently sloping to slightly rolling. The slope of the land surface is less than 2 percent but ranges between 7 and 25 percent along the banks of the North Platte River. The 100- and 500-year floodplains are within 50- to 100-feet of Elkhorn Creek and the North Platte River. The Site is underlain by an alluvial aquifer which previously served as a water supply to all of the homes in the area. The uppermost bedrock aquifer, the teapot sandstone formation, provides water to a number of industrial wells in the area.

#### **Site History**

##### **KMI Facility**

The original gas compressor station opened on the present-day KMI property in 1923. KMI has operated a natural gas fractionation, compression, cleaning, odorizing, and transmission plant at the Site since 1965. Operation and maintenance activities are performed on-Site.

Originally constructed as an earthen impoundment, a flare pit was used to collect spent material generated by the facility. Materials that may have been placed in the flare pit include:

- Natural gas condensate
- absorption oil
- emulsions, antifoulants and anticorrosive agents
- liquids accumulated in the flare stack
- potassium hydroxide treated wastes
- lubrication oils and blowdown materials from plant equipment



In October 1984, the western half of the impoundment was backfilled and a new concrete-lined flare pit was constructed on the eastern half. Use of the flare pit was discontinued and the pit was decommissioned in 1987. Waste streams formerly collected in the flare pit were rerouted into above-ground storage tanks for temporary storage or recycling.

A catchment area (a low spot in the ground just west of Elkhorn Creek) collected surface run-off water containing contaminants from the plant area and stream condensate from a dehydration unit. Various activities were undertaken by KN Energy to reroute materials from this area in 1984.

In 1965, an underground pipeline burst during facility start-up and 5,000 to 10,000 gallons of absorption oil were injected under pressure into the ground beneath the process area. Absorption oil is used to remove impurities from natural gas. Other releases occurred between 1965 and 1987 in the form of small leaks and spills near the flare pit and catchment area.

These various sources of petroleum contamination resulted in a plume of light non-aqueous phase liquid (LNAPL) and volatile organic compounds (VOCs) largely restricted to the KMI facility. The LNAPL, identified as weathered lean oil, was first observed in 1989 during the installation of ground water recovery wells. Light non-aqueous phase liquid was not observed in ground water monitoring or recovery wells between 1994 and 2001. LNAPL was again observed in as many as six monitoring wells between 2001 and January 2004 at thicknesses of one-foot or less. The occurrence of LNAPL included monitoring wells located just north and east of the KMI facility.

The plume includes non-halogenated VOCs with benzene concentrations occurring as high as 150 ug/L in the mid-1990's and spiking at as high as 470 ug/L in 2000. Subsequent years have seen a decline in benzene concentrations. The reoccurrence of LNAPL and concurrent spike in benzene concentrations around the year 2000 appears to be associated with historic low water table conditions. It is hypothesized that low water table conditions exposed isolated pockets of LNAPL previously trapped below the water table which then drained to form a layer on the depressed water table.

#### DOW/DSI Facility

The DOW/DSI Facility used mobile mounted pumps, tanks and other associated equipment to perform oil and gas production enhancement services for the oil and gas industry. DOW/DSI also performed its own truck repair and stored solvents in drums. A gravel leach sump for disposal of truck wash water located on the western portion of the property had been in use since shortly after the facility began operations. The wash water is believed to have contained chlorinated solvents. Also located on the western part of the property, a 1,000-gallon oil/water separator tank was used to separate oil film and solids from washed trucks. Separated wash water left the separator and flowed through a vitreous tile drain to the leach sump system.

A toluene storage area was located at the north end of the facility. Contaminants were released from both the wash water disposal system and toluene storage area. These releases resulted in a ground water plume originating on the DOW/DSI facility containing volatile halogenated organic compounds (VHOs) including 1,1-dichloroethene (1,1-DCE), TCE, *trans*-1,2-dichloroethene (*t*-1,2-DCE), tetrachloroethene (PCE), 1,1,1-trichloroethane (1,1,1-TCA) and 1,1-dichloroethane (1,1-DCA). Detection of VHOs extended into the residential area north of the DOW/DSI facility. At the time the ROD was signed, the VHO plume was inferred to have migrated at least 3,500 feet to the north-northeast of the source area on the DOW/DSI property. Volatile halogenated organic compounds were detected at comparable distances from the DOW/DSI facility as recently as April 2004.

## **Baseline Risk Assessment**

As part of a remedial investigation (RI), EPA prepared a Baseline Risk Assessment (BRA) for the Site in December 1989. The risk characterization assessed carcinogenic risks and the potential for non-cancer health effects of eleven chemicals resulting from direct ingestion of contaminated ground water under residential homes ("current residential scenario"). Risks were also calculated for a hypothetical scenario whereby the KMI and DOW/DSI properties were redeveloped for residential use.

The BRA reported estimated cancer risks of  $8E-5$  and  $5E-5$  for the VHO and BTEX plume, respectively, under the current residential scenario. Risks were driven largely by PCE and TCE for the plume associated with the DOW/DSI facility and by benzene for the KMI facility.

For the hypothetical future residential scenario, the BRA reported estimated cancer risks of  $3E-4$  and  $2E-4$  for the VHO and BTEX plume, respectively. The potential for non-cancer effects expressed as a Hazard Quotient (HQ) was below 1 and therefore, was below a level of concern.

The BRA concluded that adverse ecological effects due to releases from industrial areas were not expected to be significant.

Although cancer risks under the current residential scenario are below the level typically triggering remedial action of  $1E-4$ , the risk estimates were greater than EPA's point of departure ( $1E-6$ ) above which cancer risks may be considered unacceptable. In addition, the concentration of several contaminants in ground water exceeded MCLs or proposed MCLs. These included TCE, *t*-1,2 DCE, PCE, and BTEX.

## **IV. Remedial Actions**

The Site is divided into two Operable Units. Operable Unit 1 (OU1) includes the ground water contaminant plumes and OU2 includes the sources for ground water contamination. Remediation of ground water contaminant sources is complete. The OU2 work was conducted under removal action orders.

### **KMI Facility**

In 1989, under an OU2 removal order, KN Energy began recovering BTEX from the ground water and soil using ground water pump and treat and soil vapor extraction (SVE) systems. The ground water treatment involved air stripping the contaminants before re-injecting the treated water. Light non-aqueous phase liquid was noted during construction of the ground water extraction wells. Based on this observation, KN Energy installed LNAPL recovery wells and subsequently recovered 10,800 gallons. After the LNAPL recovery diminished in 1994, the LNAPL recovery portion of the pump and treat system was shut down. In 1998, KN Energy provided a Certification of Completion for the removal actions under OU2.

The ROD for OU1 specified continued operation of the ground water extraction and treatment system constructed under the removal order. Remediation under OU1 was to continue until MCLs were achieved. Remedial performance standards are discussed further in Section VII of this report.

Requirements for the OU1 remedial design (RD) included ground water monitoring to determine whether additional ground water extraction or monitoring points downgradient of the facility were needed. During the RD it was determined that contamination above MCLs had not migrated beyond the facility boundary and no system expansion was needed. The major elements of the OU1 remedy include:

- Monitoring ground water
- Extracting contaminated ground water
- Air stripping the extracted ground water
- Injecting the treated ground water
- IC restricting ground water use.

Since no expansion to the ground water pump and treat system constructed under the OU2 removal order was needed, no additional remedial construction was performed under OU1. The remedial action (RA) implemented ground water monitoring and remediation system operation and maintenance (O&M) plans approved during the RD.

The remediation system operated through 1996. After one year of monthly ground water sampling with results below MCLs, the Site was placed in post-RA status in August 1997. This began a two-year period of post-RA quarterly monitoring. EPA approved an October 1997 request by KN Energy to modify the 1993 ground water monitoring plan changing the quarterly sampling events to the months of February, May, August and November. Near the end of the two-year post-RA monitoring period, benzene concentrations were detected above the remedial performance standard of 5 ug/L. As a result of sporadic exceedences of the performance standard, a work plan for additional sampling was prepared by KMI (after purchasing the KN Energy facility) and submitted to EPA in 2000. Information resulting from this additional sampling revealed no new sources of contamination that could account for the exceedences of remedial performance standards.

In October 2000, KMI made a request to EPA to abandon the pump and treat system including ground water extraction wells. The EPA approved the request that same month and abandonment was implemented during November and December 2000. KMI made a January 2001 written request to modify the ground water monitoring network including discontinuing ground water sampling at two wells and abandonment of 11 additional wells. EPA approved the request in February 2001.

In accordance with post-RA ground water monitoring requirements, RAOs will not be achieved until the 90 percent upper confidence limit of the arithmetic mean (UCL90) for eight consecutive quarters of ground water monitoring data do not exceed the remedial performance goals. This test is performed for each monitoring well included in the post-RA monitoring program. Remedial performance goals are discussed in Section VII.

#### **DOW/DSI Facility**

Removal activities under OU2 were initiated in January 1988 and included the installation of an SVE system and excavation of contaminated soils. The SVE system recovered approximately 6,000 pounds of contaminants in the vicinity of an oil/water separator and waste oil tank. A total of 440 cubic yards of contaminated soil were removed from a chlorinated sump area and disposed off-Site. Post-removal confirmatory soil sampling was conducted in one of the source areas. The results of this sampling indicated that no further removal work was needed.

The ROD for OU1 specified the construction and operation of a ground water extraction and treatment system. Remediation under OU1 was to continue until MCLs were achieved or estimated human health risks declined below a cancer risk range of 1E-4 to 1E-6. Remedial performance standards are discussed further in Section VII of this report.

Many of the OU1 DOW/DSI selected remedy components are the same as for the KMI facility and include:

- Monitoring ground water
- Extracting contaminated ground water



- Air stripping the extracted ground water
- Injecting the treated ground water
- IC restricting ground water use.

Unlike the KN Energy facility, the DOW/DSI remedy included natural attenuation of the portion of the ground water contaminant plume extending beyond the northern DOW/DSI property boundary.

Construction of the ground water extraction/treatment system began with the installation of three extraction wells in August 1993. Subsequent construction included the installation of a ground water treatment unit and an infiltration gallery. No additional monitoring wells were installed during initial remedial construction.

Construction was determined to be complete based on a November 1993 site inspection. The remediation system operated continuously between November 1993 and April 2001 when EPA approved DOW/DSI's request to cease active remediation. The request was based on the appearance of a petroleum sheen entering the ground water treatment equipment and measurable LNAPL near the north boundary of the DOW/DSI property. The remediation system was not designed to accommodate LNAPL.

The ground water extraction rate averaged approximately 100 gallon per minute (gpm) between June 1999 and April 2001. During the reporting period the treatment system effluent met the discharge limit of 100 ug/L of tetrahalomethane imposed by WDEQ.

In accordance with post-RA ground water monitoring requirements, RAOs will not be achieved until the UCL85 of the arithmetic mean for eight consecutive quarters of ground water monitoring data do not exceed the remedial performance goals. This test is performed for each monitoring well included in the post RA monitoring program. Remedial performance goals are discussed in Section VII.

### **Site-Wide Removal Action**

In addition to contaminant recovery measures conducted under removal and remedial actions for OU1 and OU2, EPA extended a transmission line from the Town of Evansville's water treatment plant and installed a water distribution system to serve the residents in the Brookhurst subdivision. Additionally, a new water intake and related upgrades were made to the Evansville treatment plant due to the water quality of the existing plant being unacceptable. This work, which was completed in January 1989, was conducted under a removal action and minimized the likelihood of contaminated ground water use for domestic purposes.

An IC controlling ground water use is a component of the OU1 remedy for both the KMI and DOW/DSI facilities as well as the impacted portion of the residential area. Ground water well installation and use is controlled by the Wyoming State Engineer. The State Engineer regulates only ground water rights (priority of use) and the quantity used.

### **Remedy Operation and Maintenance**

Ground water monitoring is currently the only Operation and Maintenance Superfund activity ongoing at the KMI and DOW/DSI facilities.

## V. Progress since Second Five-Year Review

The second five-year review documented the following major events and progress towards achieving the RAOs. All of the recommendations from the second five-year review remain open for this five-year review.

**Table 2. Resolution of Second Five Year Review Issues and Recommendations**

Item No.	Issue	Recommendation for Follow Up	Resolution/Status
1	Institutional Control on ground water use not implemented.	Implement protocol in use at former Casper Amoco Refinery. Requires providing map to Wyoming State Engineers office illustrating area of concern. State Engineer then solicits technical opinion from Wyoming Department of Environmental Quality (WDEQ) when well permit application is received. State Engineer then implements WDEQ recommendation. EPA notified of WDEQ determination.	This recommendation remains open
2	Persistent but sporadic ground water contamination above performance standards	Continue monitoring of ground water quality trends.	This recommendation remains open
3	Reoccurrence of LNAPL in multiple monitoring wells during period of low ground water table	Continue monitoring of ground water quality trends.	This recommendation remains open

## VI. Five-Year Review Process

### Administrative Components

This is the third five-year review for the Site. The five-year review was led by Frances Costanzi, EPA Remedial Project Manager for the Site. The following Team Members participated in the review:

- John Dalton, Community Involvement Coordinator
- Richard Sisk, EPA Attorney
- Jane Francis - WDEQ Project Manager

Interviews were conducted with the consultants for the KMI and DOW/DSI facilities. The consultants were present during the August 2009 site inspection on their respective properties. These representatives were:

- Walter Weinig, Golder Associates, Inc. representing KMI
- Rick Deuell, Deuell Environmental, Inc., representing DOW/DSI

This five-year review consisted of the following activities: a review of relevant documents; meetings with the WDEQ project manager and contractors representing of KMI and DOW/DSI;

risk assessment review; data review; and a site visit. The schedule for the review extended through September 2009.

## **Community Involvement**

On August 23, 2009, a notice was placed in the *Casper Star Tribune*, the local newspaper, to inform the local community that a five-year review was being conducted. Another notice will be placed after this five-year review is completed.

## **Local Interviews**

This section summarizes the community interviews conducted during this five-year review.

In response to citizen complains, studies begun in 1986 found volatile halogenated organics in area drinking-water wells. Many homes in the Brookhurst subdivision were affected following the discovery of two separate ground water plumes.

EPA responses included connecting residents to the Evansville municipal drinking water system. PRPs pumped and treated groundwater and removed contaminated soil.

Now the site has become a non-issue. City officials and residents are satisfied with the work done to date and have no concerns. "As far as I can tell, it's off everybody's radar," says Phil Hinds, mayor of Evansville, "I haven't heard anybody talk about it in quite a while.

"It seems like they got it all cleaned up," says Tom Lavin, president of the Brookhurst Home Owners Association. "Everyone is pretty comfortable. We have no citizenry comment." Sandy Slaymaker, secretary of the Brookhurst HOA, says, "It is my understanding that all the plumes have been cleaned up. With a couple of exceptions, we are all on municipal water and use wells to irrigate and water livestock. As far as I know, there have been no problems here for years."

Charlie Schow lives in Brookhurst and is the owner of a local diner. "I think they've been doing a great job," she says. "I have a well they test constantly, and the refinery does a tree giveaway every year. To this day they're still trying to make people happy." Schow continues to use well water for drinking and home use.

Shaun Harshman is an oil industry consultant and a member of the Evansville City Council. "As far as I know, there are no interest groups involved with the Site, either from local residents or the oil and gas concerns," he says. "As an environmental consultant, I think about the Site because I work for the Chevron refinery, but I haven't heard of any outside interest in the Site at all."

Jerry Breed of the Wyoming Dept. of Environmental Quality says, "There isn't much in the way of community relations work because there hasn't had to be any. I don't know of anybody who has any interest or comments."

## **Document Review**

In preparing this five-year review report, the following documents were reviewed:

- Record of Decision, USEPA, 1990
- Consent Decree, Civil Action No. 91-CV-1042B, U.S. District Court, District of Wyoming, 1991

- Preliminary Site Close Out Report, Mystery Bridge Superfund Site, Natrona County, Wyoming, USEPA December 12, 1993
- Operation and Maintenance Plan for the DOW Chemical/Dowell Schlumberger Remedial Design and Remedial Action at the Bookhurst/Mystery Bridge Site, May 1993
- First Five-Year Review Report, USEPA, February 1999
- Memorandum from Helen Dawson (USEPA Region 8) to Lisa Loyd (USEPA Region 8) regarding natural attenuation at the KMI facility, January 2000.
- Work Plan for Additional Sampling, KMI Casper Compressor Station, Adrian Brown, August 2000
- Summary of Recent Activities Related to Free Product Discovery, KMI Casper Compressor Station, letter to Rebecca Thomas, April 30, 2001.
- Memorandum from Walter Weinig of Adrian Brown to Rebecca Thomas of USEPA summarizing a June 17, 2002 meeting between KMI and USEPA regarding the occurrence of LNAPL. June 25, 2002
- Consent Decree for Remedial Action (OU1), and Administrative Order for Removal Action on Consent (OU2)
- Second Five-Year Review Report, USEPA, September 2004.

### **Data Review**

The remedy includes a ground water monitoring program designed to track ground water levels and quality both on the KMI and DOW/DSI facilities as well as on portions of the Site north of these facilities. In preparing this five-year review report, data from the following reports were reviewed and evaluated:

- December 2008 and February, May, and August 2009, DOW/Dowell Brookhurst/Mystery Bridge Site, Monthly Progress Reports required by the Consent Decree for Remedial Action (OU1), and Administrative Order for Removal Action on Consent (OU2)
- Spring 2008, Fall 2008, and Winter 2009 Sampling Progress Reports, KMI Casper Compressor Station

A summary of these data and their interpretation for demonstrating remedy performance is provided below.

### **KMI Facility**

In accordance with the post remedial action workplan approved in 2005, ground water samples are collected from 5 wells. For the three quarterly monitoring reports reviewed, benzene was not detected above the MCL of 5 micrograms per liter and concentrations of toluene, ethylbenzene and total xylenes remain below the remedial action goals for the Site. LNAPL was not detected during the sampling events.

Remedial action was not conducted on the KMI property during the review period. Therefore, no remediation system performance data were generated.

In accordance with post-RA ground water monitoring requirements, RAOs will not be achieved until the UCL90 of eight consecutive quarters of ground water monitoring data do not exceed the numerical performance goals in the ROD. Performance standards have not yet been met using this assessment method.

### **DOW/DSI Facility**

Potentiometric surface maps show a ground water flow direction with a strong easterly component on the DOW/DSI property in early 2004. However, the ground water flow direction



varies seasonally with a stronger northerly component at other times during the five-year review period. The historical and recent occurrence of VHOs in residential areas northeast of the DOW/DSI facility suggests significant variability in the ground water flow direction.

Hydraulic capture analysis was not assessed as ground water extraction ceased in April 2001. VHO iso-concentration contour maps show an area of contaminated ground water in the center of the DOW/DSI property with a maximum PCE concentration of 8.9 ug/L. Over the quarters reviewed, PCE concentrations above MCLs have been measures in up to 4 wells off of the DOW/DSI property. In the August 2009 progress report, the concentrations in these four wells ranged from 7.0 to 9.6 micrograms per liter. The MCL for PCE is 5.0 micrograms per liter.

Sporadic PCE concentrations of this magnitude are typical of the past several years. In accordance with post-RA ground water monitoring requirements, RAOs will not be achieved until the UCL85 of eight consecutive quarters of ground water monitoring data do not exceed the numerical performance goals in the ROD. Performance standards have not been met using this assessment method.

### **Site Inspection**

The Site Inspection was performed on August 21, 2009, by Frances Costanzi, the EPA Remedial Project Manager, and Jane Francis, the WDEQ Project Manager. Consultants from KMI and DOW/DSI conducted a tour of their respective facilities with EPA and WDEQ. The purpose of the Site inspection was to observe the current Site condition and ground water monitoring network, and to discuss the results of ground water monitoring. Remediation systems on both properties were not operating. Portions of the remediation system on the KMI property had been demolished. Site security was adequate at both facilities although Site contaminants pose no recognized threat to trespassers. A tour of the residential areas north of the KMI and DOW/DSI facilities was conducted by Rick Deuell of Deuell Environmental and involved drive-by observation of monitoring wells.

## **VII. Technical Assessment**

### **Question A: Is the remedy functioning as intended by the decision document?**

Yes, the remedy is functioning as intended by the decision document.

The remedy consists of two components:

- ☐ Interrupt the exposure pathway through prohibition on the use of ground water.
- ☐ Restore ground water through active remediation. Natural attenuation was also a component of the remedy for the downgradient portion of the DOW/DSI VHO plume.

The construction of a permanent water supply for the Site residents in 1989 minimized the likelihood of residential use of contaminated ground water. However, a temporary IC is described in the ROD as deed and ground water use restrictions. This IC has not been implemented and therefore, this portion of remedy is not functioning as intended in the decision documents. The nearby Texaco facility regularly analyzes tap water samples from the couple of residents who chose not to connect to the public water supply. The results indicate water within safe drinking water limits.

The remedy anticipated several milestones including:

1. No ground water contaminated above MCLs or proposed MCLs will be allowed to enter the subdivision from the KMI property.

2. The ground water restoration time frame for the BTEX plume originating on the KMI property is one year.
3. The ground water restoration time frame for VHO plume originating on the DOW/DSI property is six years.
4. Continuation of the removal action on KMI property that was in progress at the time the ROD was signed.

Each of these milestones is addressed below:

Milestone No. 1 - Ground water samples have regularly been collected from a set of monitoring wells located immediately down-gradient of the KMI property and several hundred feet from the nearest residence. These wells include EPA 9-1, EPA 10-1 and EPA 2-11. Benzene concentrations have been below the MCL of 5 ug/L in recent quarters. This, coupled with the lack of persistent exceedences of MCLs at these monitoring locations suggests that ground water exceeding MCLs has not encroached on the residential areas.

Milestone No. 2 - Active remediation of ground water was conducted at the KMI facility for approximately six years after the ROD was signed (discontinued in August 1996). The ROD recognized that the actual remediation time frame may deviate from the stated expectation of one year. The benzene concentrations appear to continue to have slowly decreased over time.

Milestone No. 3 - Active remediation of ground water was conducted at the DOW/DSI facility for approximately eight years (discontinued in April 2001). Exceedences of MCLs are sporadic and the PCE concentration has remained below 11 ug/L during the last several quarters. As with the KMI facility, the ROD recognized that the actual remediation time frame may deviate from the stated expectation of six years. The ROD further recognized that contaminant levels may cease to decline and may remain constant at levels higher than the remediation goal.

Milestone No. 4 - KN Energy issued a certificate of completion in 1998 for all source mitigation work performed under removal orders.

**Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?**

Yes, the MCLs for the chemicals detected during the five-year review period remain unchanged from those specified in the ROD.

**Question C: Has any other information come to light that could call into question the protectiveness of the remedy?**

Yes, the potential for indoor air contamination has been reviewed in the past and determined to be insignificant. However, since more is now understood about this issue, this review recommends that a new review of potential indoor air contamination be conducted to ensure this potential avenue of exposure has been adequately addressed. Additionally, the ICs required by the ROD have not yet been implemented.

### **Technical Assessment Summary**

According to the data reviewed and the Site inspection, the remedy is largely operating as intended by the ROD. Sporadic post-remedial low-level detections of contaminants above the performance goals were anticipated by the ROD as is re-evaluation of remedy performance goals.



Protectiveness currently is achieved through interruption of exposure pathways. No domestic use of contaminated ground water occurs on the KMI or DOW/DSI properties where most of the remaining contaminated ground water exists. The continued use of a public water supply in the residential areas minimizes the likelihood of human contact with contaminated ground water. However, an IC prohibiting ground water use required under the ROD has not been implemented. Implementation of this IC will further reduce the likelihood of human contact with contaminated ground water.

### VIII. Issues

Based on the information collected during the third five-year review report, the following issues outlined in Table 4 were identified:

**Table 3. Issues Identified**

Item No.	Issue	Affects Current Protectiveness of Remedy	Affects Future Protectiveness of Remedy
1	Institutional control on ground water use not implemented.	N	Y
2	Institutional controls on KMI and DOW/DSI properties are not implemented.	N	Y
3	Sporadic ground water contamination above performance standards.	N	Y
4	Reoccurrence of light non-aqueous phase liquid in multiple monitoring wells during period of low-ground water table.	N	Y
5	Site documents indicate that indoor vapor issues are not an issue at the Site, but these documents are dated.	N	Y

### IX. Recommendations and Follow-Up Action

Based on the information collected during the third five-year review report, the following recommendations and follow-up actions outlined in Table 5 were identified:

**Table 4. Recommendations and Follow-Up Actions**

Item	Issue	Recommendation for Follow Up	Party	Milestone Date	Affects Protectiveness Y/N Current/Future	
1	Institutional control on ground water use not implemented.	Implement protocol in use at former Casper Amoco Refinery. Requires providing map to Wyoming State Engineers office illustrating area of concern. State Engineer then solicits technical opinion from Wyoming Department of Environmental Quality (WDEQ) when well permit application is received. State Engineer then implements WDEQ recommendation. EPA notified of WDEQ determination.	PRP/ WDEQ	June 2010	N	Y

Item	Issue	Recommendation for Follow Up	Party	Milestone Date	Affects Protectiveness Y/N	
					Current	Future
2	Institutional controls on KMI and DOW/DSI properties are not implemented.	Land use restrictions need to be implemented on the KMI and DOW/DSI properties since clean up was not done to levels that allow for unrestricted use.	PRPs/EPA	June 2010	N	Y
3	Sporadic ground water contamination above performance standards.	Continue monitoring of ground water quality trends.	PRP/EPA	Ongoing until ROD requirement is met	N	Y
4	Reoccurrence of light non-aqueous phase liquid in multiple monitoring wells during period of low-ground water table.	Continue monitoring of ground water quality trends.	PRP/EPA	Ongoing until ROD requirement is met.	N	Y
5	Site documents indicate that indoor vapor issues are not an issue at the Site, but these documents are dated.	Conduct a review of the most recent data to ensure the indoor vapor exposure pathways remains protective.	EPA	June 2010	N	Y

EPA should address the above-listed items in conjunction with WDEQ.

#### **X. Protectiveness Statement**

The remedy as implemented is currently protective of human health and the environment.

Operable Unit 1, which was focused on the contaminated groundwater at the Site, is currently protective of human health and the environment. Contaminated ground water remaining on the KMI and DOW/DSI facilities is not currently used. Ground water contamination in residential areas has remained at or below the action levels for multiple monitoring events. A public water supply in the residential area minimizes the likelihood of human exposure to Site contaminants. The protectiveness of the remedy will be further enhanced once institutional controls for ground water are implemented.

Operable Unit 2, which focused on the contaminant source areas, is currently protective of human health and the environment. Work under this OU was conducted under two removal orders for the KMI and DOW/DSI properties. The protectiveness of the remedy will be further enhanced once institutional controls are implemented.

The potential for indoor air contamination has been reviewed in the past and determined to be insignificant. However, since more is now understood about this issue, this review recommends that a review of more recent data be conducted to ensure this potential avenue of exposure has been adequately addressed.

## **XI. Next Review**

The Site requires ongoing five-year reviews in accordance with CERCLA § 121 (c). The next five-year review for the Mystery Bridge Site will be performed by September 2014, five years from the date of this review.



## **ATTACHMENT 1**

### **Site Map**



## Mystery Bridge Site

Brookhurst, Wyoming

### Legend

Rivers

Roads

Railroads

City Limits

National Priorities  
Listing (NPL)  
Boundary

Location of Mystery Bridge Site



In Nelson County, Wyoming



AUGUST 31, 2004

Source: Aerial map (1999) downloaded  
from the National Aerial Photography  
Archive (NAPL) website.  
Photograph: 97-01-0004  
Date: August 31, 2004  
Data: Data from the National Aerial  
Photography Archive (NAPL)

